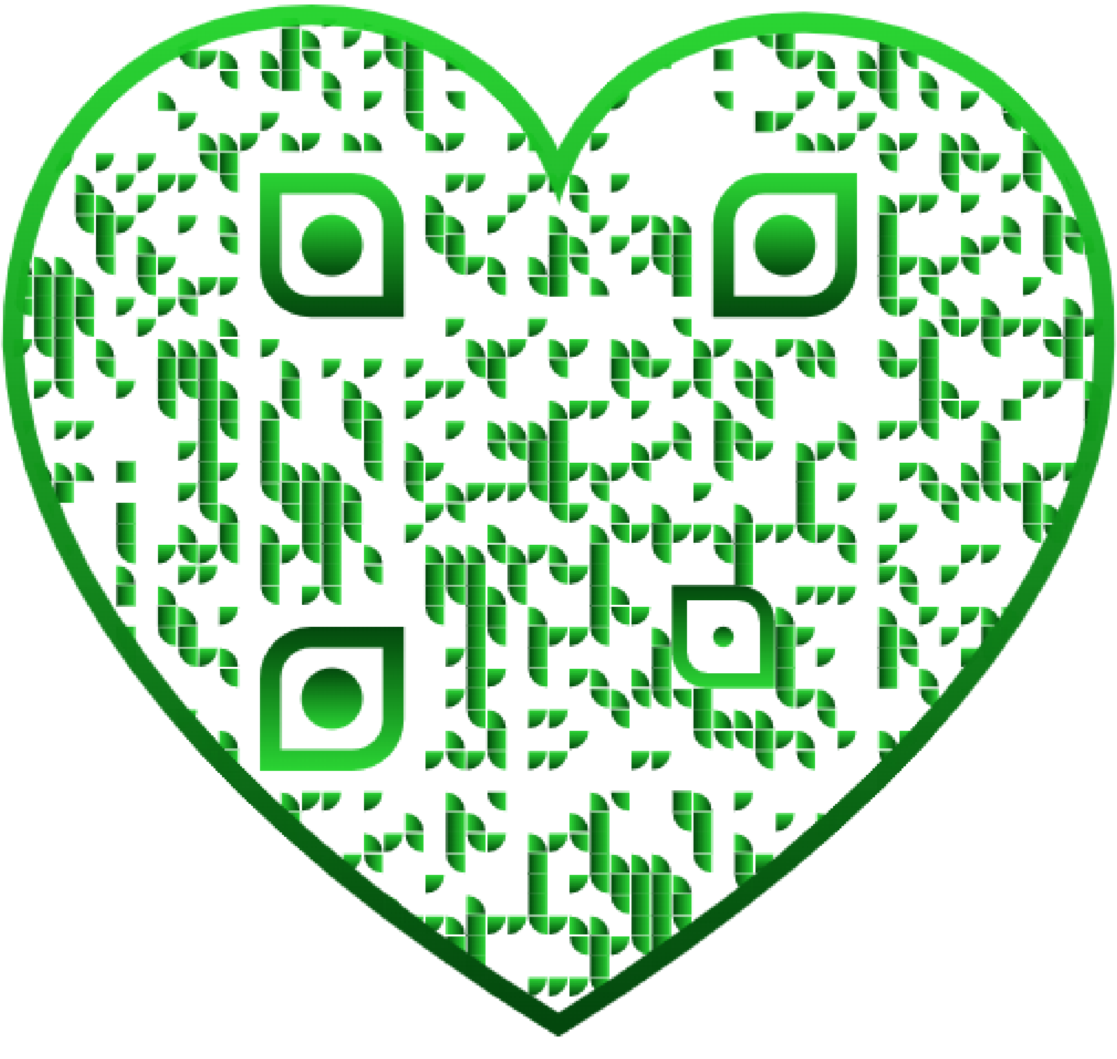
HISTOLOGY

اللجنة العلمية A-37

طب بشري 2021

@Histology37A



رئاسة اللجنة :

عبدالرحمن أبوهداعش　　هاجر صبرة

دائرة الهستولوجي :

رئيسة : علياء الجمر

عبد الوهاب قشيش　　محمد الزمر

أحمد الرعود　　محمد الصعفاني

أحمد الحيدري　　أيمن الحميري

بكر المعازي

الكاتبة :

أمل الشميري

- The integumentary system is made up of skin and derivatives:
- This system is Composed of three layers and appendages:
  1- Epidermis.
  2- Dermis.
  3- Hypodermis.
  4- Appendages → which are:
    - Sweat glands.
    - Sebaseous glands.
    - hair Follicel
    - Nails.

* The epidermis:-

Is an epithelium tissue located above the dermis
epidermis → is the superficial part of skin.
- It's stratified squamous epithelium keratinized.
- It's ectodermal in origin and compose of Five layers in thick skin and Four layers in thin skin.
- It forms projections toward the C.T of dermis.
- These projections of epidermis are called (epidermal ridges).
- Some Histology text books classify epidermis as a glands (why) Because it forms keratine.

* The Dermis:- Dermis mean skin)

- It's the Connective tissue portion of skin wich is Found Below the epidermis.
- Dermis is Composed of 2 layers of C.T:-
  1] The papillary layer.
  2] The Reticular layer.

* Dermis and epidermis together Form the skin.
- epidermis is the superficial layer of skin.
- Dermis is the Deep layer of skin.

---

* What's the difference between the papillary layer and Reticular layer of dermis?
- The papillary layer is the superficial layer of dermis and made up of loose C.T.
- The Reticular layer is the deep layer of dermis and made up of dense irregular C.T.

---

* The hypodermis:-
- IS the superficial fascia of the body, which the skin reasts on it.
- It's not part of the skin.
- It's made up of loose or adipose Connective tissue.

---

* What's the difference between tounge and lingua?
Are the same but tongue is English language lingua is latin language.

---

* Epidermis is Composed of 2 types of Cells:
1. Keratinocytes.
2. Nonkeratenocytes.

- keratenocytes are the cells of epithelium wich Form the keratin.

---

* They are formed of 5 layers in thick skin wich are:
- Stratum Basale.
- Stratum spinosum.
- Stratum granulosum.
- Stratum lucidum.
- Stratum Corneum.

Basal layer → is an English word.
Stratum Basale → is a scientific term.

1) Stratum Basale: (Germinactivum)

- it is also called germinetivum because it's mitotically active and responsible For Constant renewal of the epidermis.
- it is composed of One layer of Columnar cells which are rich in Free ribosomes.
- it has 2 types of junctions:
  A. Hemidesmosome:
     which Connect the Cells with the tissue below them.
  B. Desmosomes:
     which connect the Cells with the cells above of them.

2) Stratum Spinosum:

- This layer is Called spinosum because its Cells have spiny projection.
- it is the thickist layer and its cells are pollyhydral.
- in living, The Cells of this layer don't have any spines.
- it appears spiny in slides because of the process of shrinkage during slide preparation.
- Mitotically active.

- The cells have tonofilaments (Cytoskeleton) which participate in keratin formation.
- It has one type of junction wich is (Desmosome) that connect the cells of this layer with the cells of other layer.
- Stratum basale and stratum spinosum together form → Malpighian.

---

3) Stratum Granulosum:
- It's composed of three to five layers.
- It's the most superficial layer of nucleide cells. (that mean it's the last layer wich their cells have nucleus, the other next layer don't have)
- it's name Granulosum because it has 2 types of granules:
  1) keratohyline granules:
  - These granules are not caoted by membrane, they secrates a hyline substance which collect the tonofilament to form later eleidine
  * eleidine → is translucent substance.
  2) lamellar granules or membranous-coating: granules: These granules are caoted with membrane. and they secrate lipid around the cells to act then as a waterproof barrier.

---

4) Stratum Lucidum: (Lucida → light)
- It's a translucent layer → Cose of eleidine
- It appears homogenous.
- The cells of this layer have no nuclei, no organells. But they still contain lipid, so they appear clear.

5) Stratum Corneum:

- it's the most superficial layer of epidermis.
- it's adead keratinized layer with Flattened cells. and has thick plasma ~~[illegible]~~ lemma.
- The cells have no nuclei, no organells.
- when cells become darker, they are more inactive.
- it's Filled with lipid → water proof.
- The cells which occure in its surface are called horny cells and they are desquamated every time to be spread in the air.

* Some references consider the skin as a glands? (why?) Becouse of its secration and Formation of keratin.

NON-KERATINOCYTE: (Not epithelium cells)

① Melanocyte:

- Branched cells that Found in the basal layer.
- They make and transfer melanin.
- They transfer melanin to melanophores.
- Melanin is the major Factor For coloration of skin.
- All people have the same number of melanocyte and the difference is in the activity which determin by gens.

Notes:

- melanosomes is the storage form of melanine.
- When melanosomes get higher, cells become darker.
- The other factors that affect on skin Colour:

1) Sunlight. 2) pregnancy. 3) UV.

- When the cell Becomes dark that mean it's about to die.

↑ melanocyte activity → ↑ amount of melanin → ↑ darkish skin.

* When you lean on a part of your body a lot of time this part will keratinized, and converted to blackness.

* melanophores : (phorse → carrier) → carry melanine.

---

② Merkels:

- Basal layer of epidermis.
- At the base of merkel's cells there's a sensory nerve wich make it mechanoreceptors → receptors of touching.

---

③ Langerhans cells:

- They arise from monocyte in the form of macrophages, so they are mesodermal in origin.
- They are (APC) antigen presenting cells.
- They send the antigens to the lymphocytes in the cell mediated immunity.

* There are 2 types of immunity:

1) Hormonal immunity:
   - not to be confused with humeral.
   - Responsible for antibodies secration.
2) Cell mediated immunity:
   * it will be explained later in lymphoid tissue chapter.

---

* Mention the name of the cell wich is found in the epidermis and it's not belong to the epidermis.

- Non-keratinocytes.
  ① melanocytes.
  ② langerhans cells.
  ③ merkel cells.

Glands :

① Sweat glands:

- They are like the small islands close to each other, wich secrates a watery secreation.
- They present in the thick and thin skin.

* There are 2 types of sweat glands:-

1) Eccrine glands:

- These are Cutanous glands which secreates sweat by exocytosis to outside the skin, So they also called merocrine glands.
- They are present in dermis and hypodermis.

Structure → These types of sweat glands are small coiled tubular glands with two parts:

* Ducts: their ducts are stratifick cuboidal epitheliam they open into the epidermis → directly into the skin surface.
* Scretory unit : it's a high coiled tubule.

- it's composed of three types of cells:

1- Dark cell → secrates mucous.
2- Clear cell → secrates watery and mucous secration. but the watery is predominant.
3- between them there are myoepithelial cells → they present around the scretory units.

2) Apocrine glands:

- These are large Cutanous glands.
- They secrates a chemically complex secration.
- They are large simple coiled tubular glands. with short duct.
- They open into the hair follicel.
- Their secretory units lie deep in the hypodermis.

- They secrate their secration with the upper part of the cell.
- This type of glands appear after puberty due to hormones.
- Found in the axilla , pubic region and areola of Breast .

---

* The similarities between Eccrine and Apocrine glands :

- Found in dermis and hypodermis.
- Have the same secretory cells.
- Have myoepithelial cells.

* The Difference between Eccrine and Apocrine glands :

- Apocrine found in axilla , pubic and areola.
- " open in the hair follicles.
- " duct have large lumen.
- They differ in secretion.
- Apocrine Secration appear after puberty.

---

* Why the sweat that is produced by the sweat glands has that smell?

- Becouse of the piece of the epithelium which is secrates with the secration by apocrine and Becouse of the presence of the Bacteria.

* why the duct is not appear continous in the slide? - Becouse it's coiled.

* Why some secration in specific sites of the body give order?

- Becouse the type of secration is apocrine lose of peice of cytoplasm in that secration.

---

* Sebaceous glands :-

- these glands secrates Lipid onto the Surface of skin with short ducts.
- they are halocrine glands.
- they secrates sebum wich keep the skin soft and waterproof.
- they associated with hair Follicles.
- they appears every where in the body except the thick skin (palms and soles)
- they are located in the dermis
- they are acini (Grouped alveoli)
- they doesn't stain, Just like the mucus
- they contain 2 types of Cells:
  (1) outer basal cells (stem cells) which is converted into Central cells.
  (2) Central (vaculated) Cells that contain very very dark nuclei.

---

* explain the secretory unit of sepaceous glands:
- it's edges is Formed of basal cells which are stem cells. divide to Form Central cells which secrate the Sebum → lipids.
- the nucleus is dark → the cell is about to die.
- So we secrates dead cells to the out side.

* Why we don't kiss by Fingers instead of Lips???
- Becouse it's not sensitive.

* Is there in the lips sebaceous glands?
- yes, the Lips has sebaceous glands but low in number

* Which type of epithelium tissue is in the Surface of the lips?

- stratified squamous epithelium which cover the Surface of the Lips.

---

* Arrector pilli m. :-

- it's a smooth m. related to the hair Follicles.

it's actions:

(1) erection of the shaft of the hair.
(2) squeezing of the contents of the sebaceous gland.
(3) depression of the skin surface " goosy skin "

---

* The Hair :

Composed of 4 layers :

(1) Hair shaft: (The portion that you can see)
medulla , Cortex , Cuticle
(2) Inner Root sheath:
Cuticle, Huxley's layer, Henle's layer.
(3) Outer Root sheath:
(4) Connective tissue sheath.

---

* What are the differences between the thick skin and thin skin?

.thIK SKIN.	.thIN SKIN.
there is stratum lucidum.	there is no stratum lucidum.
present in palms and soles.	present in every where in the body except the palms and soles.
thicker → which thicker - epidermis. - malpighian(basal, spinosum) - Keratine layer.	thinner → which thinner - epidermis - malpighian layer. - Keratine layer.
hair Follicle → No	present
Sebaceous gland → No	present
arrector pilli m. → No	present
dermal papillae → Numerous	Few.
sweat glands → Numerous	Few.

* معلومات إضافية من ملزمة مجلي :-

- Stratum spinosum :
  - Spines , why do they appear ? what are they ?
    It's related to cell junctions .

- Tight Junctions , are they found in the oesophagus ?
  - No , they are never found with stratified epithelium.

---

*Stomach → simple epithelium → tight junctions.
*Dudenum → simple epithelium → tight junctions.
*Oesophagus → stratified epithelium → no tight junctions.

* Always with stratified epithelium there are desmosomes junctions .

*Desmosomes junctions are less strength than the tight junctions .

*The tight junctions are found with the simple epithelium to compensate their weakness → these junctions prevent leakage.

---

* **Sebaceous Glands** :- They are a holocrine glands.
holo → whole
crine → secration

- The secretory units of all glands are formed of one layer always. e.g. stomach , Intestine. , But the secretory units of Sebaceous glands is formed of two layers to replace the dieing cells.
- It's situated with hair follicles.
- It shows high activity of division.

---

* Sweat Glands :-

- They are of two types :-

① Eccrine = Merocrine → the secrations only → (water + salt)
* they present in odourless sites.

② Apocrine = Apical part is secrated too.
* They present in odourous sites.

---

* Stratum basalis (✓) / stratum basal (X)

* Thick & thin skin, their colors & melanin:-
- Thick → white.
- Thin → The color of the skin depends on the genes, and it differs from one to another.

* The most important Cells of the non-keratinized cells are the melanocytes.
- Are they considered as part of epithelium tissue or C.T.?
→ They are considered as a part of the C.T. because some of it are found in the C.T.

* بعض المعلومات الإضافية من ملزمة يسري

* Notes:-
- The spines of the fourth layer are not normally formed, but some agents cause its appearance in e.g. Alcoholism.
- The distribution of melanin starts from below upwards, in white skin they still in the 5th (basal) layer, but in darker skin they distributed in the 4th layer and so on.

- What is the albinism?
→ It's inactive melanocyte in epidermis.

- Why the myoepithelial cells are not found in pancreas although its exocrine function? - Because the difference in embryonic development, myoepithelial develop from neural crest and pancreas develop from endoderm.

* What are the types of papillae in general?
- lingual papilla.
- Foveolae papilla.
- skin papilla.
- Major daodenal papilla.

---

* What is the relation between the name of stratum germinalis and its function?
- Germ means stem cell. Accordingly, it's the proliferation layer which proliferates and goes up.
- This germ Cells Can be Cuboidal Cells.

---

* When we say stem Cell we mean (take in consideration) three things:-

① Cell potentiality.
② Cell differentiation.
③ Cell specialization.

---

* What is the difference between the ribosomes and basophils?

A. the expression 'basophils' is in the language of **L.M.** while 'ribosomes' is in the language of **E.M.**

B. All ribosomes are basophils, but **not all** basophils are ribosomes.

LYMPHOID tissue LECTURE (2)

Lymphoid tissue h tow important Components:

(1) Stroma.

(2) Paranchyma.

Stroma → is the connective tissue in lymphoid tissue and we Called it the reticular tissue.

paranchyma → it is the lymph cells.

Lympoid tissue structures:

(1) diffuse lymphoid tissue.

(2) Solitary lymph nodules

(3) Tonsils.

(4) spleen.

(5) lymph node.

(6) Thymus gland.

1- DIFFUSE lymphoid tissue:

non-organized accomulation of lymphocytes.

Found in «GIT» and «Respiratory system.

According to the site where it is Found is referred to as

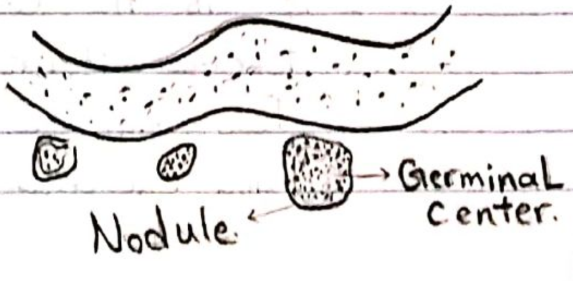
MALT → Mucosa - associated lymphoid tissue.

BALT → Brouchus - associated lymphoid tissue.

GALT → Gut - associated lymphoid tissue.

2- SOLITARY lymphoid tissue:

_Nodule is the structral and Functional unit of lymphoid tissue.



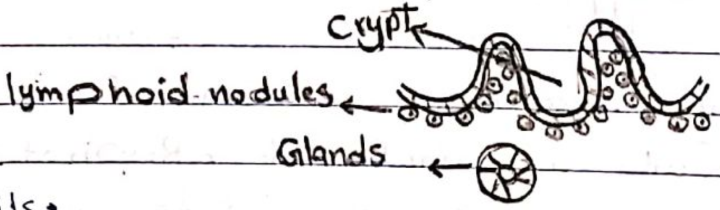
*iF the nodules have no germinal center it Called Primary nodules « Follicles »

*iF the nodules have germinal Center it Called Secondary nodules « Follicles »

3- TONSILS:

There are three types of tonsils:
(1) Lingual tonsils.
(2) palatine tonsils.
(3) pharangeal tonsils.

(1) Lingual tonsils:
- present at the base of the toungue Coverd by stratified squamous non-keratinized epithelium.
- there are Single, wide, Crypt.
- the glands acts to washes the crypt.



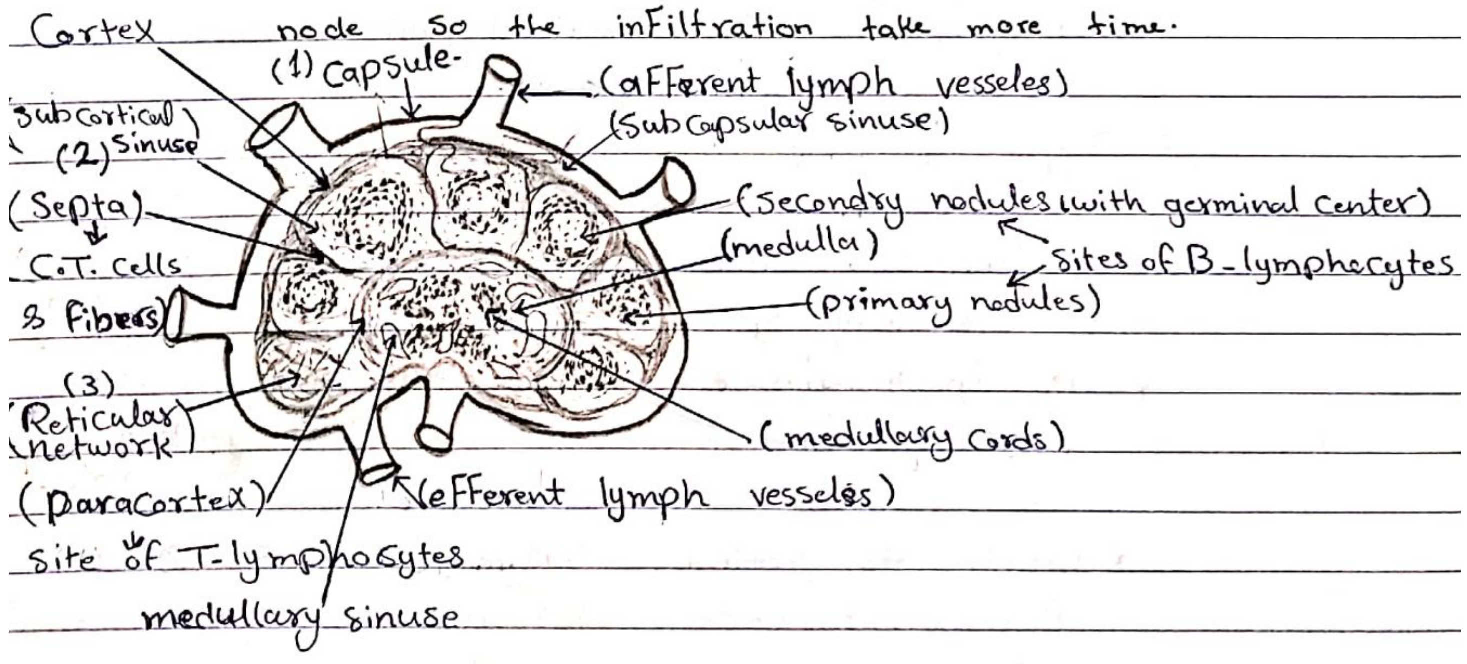
(2) palatine tonsils:
- two masses of lymphoid tissue embedded in the C.T under the mucose membrane of oro-pharynx.
- covered by stratified squamous epithelium non-Kerafinized.
- there are multiple narrow branching primery and Secondary crypts.
- it is the Commenest to occurrence of tonsillitis becouse it has narrow and branching crypt and Few mucous glands that washes the depris of Coll and bacteria.

(3) pharyngeal tonsils:

- Single mass present in the upper part of the posterior wall of the pharynx.
- Covered by pseudostratified Columnar epithelium.
- Adenoids→ inflammation of pharyngeal tonsil.

4- LYMPH NODES:

- it is kidney in shape bodies.
- They are abundant and Found along lymphatic vessels.
- present of → stroma (capsule, Septa and reticular Fibers)
  → ~~PS~~ Parynchyma (Cortex and medulla)
- Septa is extension of Capsule inside the Organs.
- Reticular Fiberss present as meshwork in all the medulla
- present of Cortical nodules and medullary cord and sinus
- There are 10-12 affrent lymph vessels and only One eFFrent lymph vessels, to delay the Flow of lymph in node so the inFiltration take more time.


Cortex
(1) capsule
(aFFerent lymph vesseles)
(subcapsular sinuse)
(subcortical) (2) sinuse
(Septa)
C.T. cells & Fibers
(secondry nodules (with germinal center)
(medulla)
sites of B-lymphocytes
(primary nodules)
(3) (Reticular network)
(medullary cords)
(paracortex)
site of T-lymphocytes
(eFFerent lymph vesseles)
medullary sinuse

*(1), (2), & (3) → stroma.

* What arrangement of lymphoid tissue which occures in Cortex?
  - primary nodules → nodules of lymphocytes with no germinal center.
  - Secondary nodules → nodules of lymphocytes with germinal center surrounded by small lymphocytes → From the periphary wich is Called Sometimes «corona»

---

* The lymphnode, the spleen and the thymus are Formed of capsule and trabeculae (Stroma)
* There is Bvs, Nerves and C.T in the trabecula.
* What is sebta «trabecula»?
  They are extensions of the Capsule which divide the Cortex into Compartments.
* Cortex is Filled with nodules of lymphocytes.
* Medulla is Filled with Cords of lymphocytes.
* para Cortex → it's structraly Like ring between the Cortex and medulla and it's the site of T.lymphcytes in lymph nodes.
* paranchyma → is the Functional part = Lymphocytes + Reticular network.
* Types of Sinuses in Lymphoid tissue:
  1) SubCapsular sinus.
  2) Trabecular sinus.
  3) Medullary Sinus.
* The lymph enter the lymph nodes by afferent L.vs then pass through the sinuses to be then get out by efferent L.vs.
* Why is the germinal Center bale?
  Becouse it Contains big and few Lymphocytes.
* The germinal Center mean there's activation of lymphocytes Formation and plasma Cells.

---

* Some structures of L.T are seen in L.M in ardinary way.
  ①→ C.T. ② AFFrent L.vs. ③ arteriols and venules
  ④ Capsule. ⑤ subcapsular sinus. ⑥ trabeculae.
  ⑦ trabecula sinus. ⑧ primary nodules , secondary nodules
  ⑨ para cortex ⑩ medulla ⑪ medullary Cords
  ⑫ medullary Sinus. ⑬ reticular Fibers (stain with Silver stain → Argyrophilic)
  ⑭ EFFerent l.vs.

---

* The lymphatic vesseles and Capillaries:

1] lym. vesseles:
- the affrent are many (10 - 12)
- the effrent are few (1-2)
- why there are 12 affrent l.vs obvers one efferent L.vs in Lymph nodes?
  to give enough time For Filteration of lymph.

2] lym. Capillaries:
- They seems to be sinusoids more than being Capillaries:
  ① Subcapsular sinus.
  ② Trabecular or Cortical Sinus.
  ③ Medullary sinus.

---

* The blood vesseles beside the affrent L.vs are Called HEV → these are venules whic are lined with simple Cuboidal epithelium not simple squamous epithelium → this happens only in this Case That's why it's called high endothelium B.vs.
  T. lymphocytes come From these B.vs.

---

* The T. lymphocytes get out from those B.vs and form papulation in the para cortex (T-dependent zone) These happen in the thymus and lymph nodes.

---

* The cells in lymph nodes are:
T and B lymphocytes → those are the functional unit of lymphoid tissue.

---

* Each one of them has certain sites of location:
→ T. lymphocytes are so called because the develop in the thymus gland.
→ B. lymphocytes are so called because the develop in Bursa of Fabricius in Birds.

* The most important part of the lymph node is the T-dependent zone = the paracortex of lymph nodes.

SPLEEN :

* Spleen is a lymphoid organ.
* It's composed of capsule, trabeculae (B.v, N., ...) and Reticular tissue → which all form the stroma of spleen. white pulp with the red pulp form the parachyma of spleen.
* it is rich with blood vesseles.
- the white pulp in spleen is composed of lymphocytes and the red pulp is composed of blood cells (RBCs)
- the white pulp is a nodule or a group of lymphocytes around a central arterial which is related to B vs.

- This property is not present in the lymph nodules of lymph nodes, just in spleen because it's related with the filteration of blood.

* The blood supply of spleen :

- Splenic artery ⟶ trabecular artery from the capsular artery ⟶ Central artery (in the center of white pulp) ⟶ pulp arteriol (after the central arteriol) → sheath arterial which surrounds the pulp arterial (it's rich with macrophages For cleaning of blood) ⟶ sinusoids (when the blood enters the sinusoids it's called the close circulation) → pulp vein ⟶ trabecular vein → splenic vein.

* The T. lymphocytes wich surround directly the Center arterial are like a lymphatic sheath called periarteriola.

* The B- lymphocytes are above the T. lymphocytes.

* The macrophages sheath → it's major Function is to remove the aged cells = cleanlines.

* How to differeniate between the artery and vein?
The artery is surrounded by the pulp.

* What are the contents of spleen?
① White pulp = pulps + Splenic nodules.
Contain T. lymphocytes and Central a. ← germinal Center contain B. lymphocytes.

② Red pulp = sinusoids + splenic cords
They are Blood cells → (WBCs, RBCs)
old orthrocytes

---

* Outside the white pulp all are blood cells (RBCs) and sinusoids.

---

* How many circulation do we have in the Spleen?
2 Circulation:
① Close circulation: It's when the blood enter directly into sinusoids.
② Open circulation: It's when the blood leaves the sinusoids to the cords wich means outside the sinusoids → in the red pulps which called cords.
* The purpose of these circulation is to clean and Filter the Blood.

---

* The source of T. B. lymphocytes is the bone marrow.
- B lymphocytes → go to the lymphatic tissue e.g: (spleen, L. N, mucus of mucosa)

- T lymphocytes → go to the ~~lymphatic tissue~~ thymus, in case of shrinking of the thymus for any reason the T. lymphocytes go to the other sites which they belong in the other L.T and these sites are called T- dependent zones.

---

* The T- dependent zone of L.N is the para cortex.

---

* The T- dependent zone of spleen is the PALS.

* Differentiate between the lymph nodules in the spleen and in the lymph nodes.

- They are the same in the shape but with one difference which is the central artery.
- The lymph nodules in the spleen have central artery.
- The lymph nodules in the L.N doesn't have " ".

---

* What's the functions of spleen?

- Antibodies formations and T and B lymphocytes proliferation.
- Filter of blood and destroy of old erythrocytes.
- Formation of blood (Haemopoiesis) during fetal.

---

* spleen monitor the blood
↓
«Filter»

---

* بعض المعلومات الإضافيه من ملزمه مجلي :-

The lymphoid Tissue :

- It is aggregation of lymphocytes.

- In the slide, you'll see many dots representing the nuclei of the Lymphocytes.

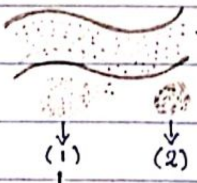
- What are 1ry lymphoid organs, 2ry lymphoid organs ... lymph nodes and Lymph nodule?

- What is the lymphoid tissue ?
  It is accumulation of lymphocytes and supporting Cell
  C.T = Reticularcytes = argyrophilic.

→ Complexities :

① Diffuse Lymphoid tissue :
It is the simplest lymphoid tissue.

* Lamina propria
الطبقه التا بعه

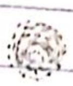


→ [sq. str. epi.]

(1) ↓ The 2nd defense line

« The Oesophagus »

② Solitery Follicles / nodules « organized »
A: Primary Solitery nodules = homogenons.
B: Secondary Solitery nodules
↳ pale area = middle = germinal center.



↳ Dense area = prephry = Cortex = granules.

* site:

everywhere « of lymphoid organs» except the thymus.

③ Aggregation of Lymphatic nodules:

= aggregations of ②

Types:

A: mucosa associated Lymphoid tissue «MAIT» in the GIT

B: Gut associated lymphoid tissue (GAIT)

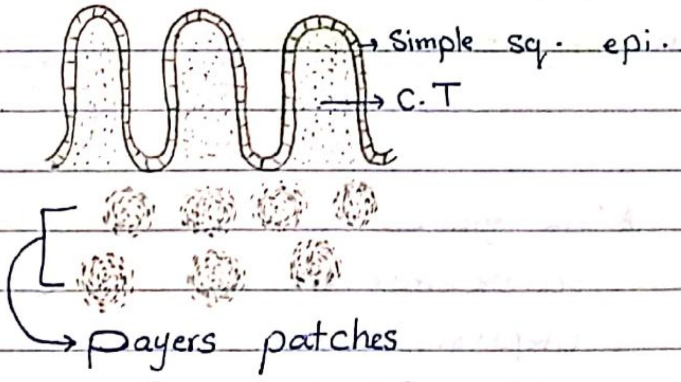
C: Bronchus associated Lymphoid tissue (BAIT)

The GALT:

- The ilium is characterized by these «payer's patches»
- These payers patches are not Found in the Oesophagus because the stratifide epithelium is the first defense line there. they are Found in the ilium because the First defense Line is simple epi. and it is the site of absorbance.
- The villi:

at the dudenum it is organized.

at the ilium it is unorganized due to the payers patches presence.



= the second defense Line

= aggregated L. T.

«villi in the ilium»

* What are the «APCs» ? Where are they Found?

- APCs mean « Antigen presenting cells ». it work by Catching the antigen and giving it to the lymphocyte.
- Macrophages are type of APCs.
- APCs are Found above the Lymphoid tissue.

* What is « M-Cell » ?

- M-Cell means Macrophage «MicroFold» Cell.
- It is Found within the lymphoid tissue. It is «APC»

* Do not expect the presence of the lymphoid tissue under the skin.

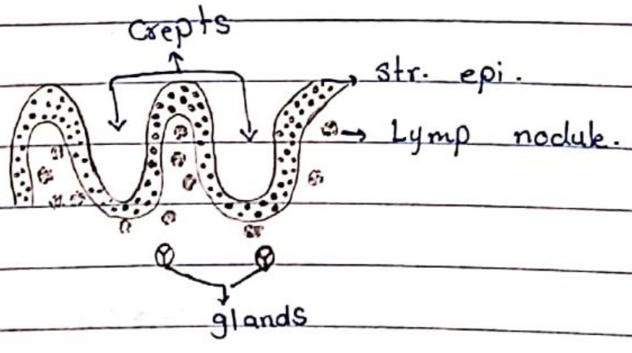
* L.T and the GIT:

At the Oesophgus: Diffuse lymphoid tissue.
At the Stomach and dudenum: Solitery nodules.
At the ilium: Aggregated Lymphatic nodules.
At the Large intestine: the Appendix.

④ Tonsils:

→ They are areas wich Contain alot of Lymphoid tissue « Diffuse + Nodules »

* Lingual Tonsiles:



* The glands secrete into the Crepts.

* **Pharngeal Tonsils:**

→ The Same as the Lingal tonsils, but the epithelium is pseudostratified and the Site is the pharynx.

→ They are also Called the adenoid tonsils.

* **palatin tonsils:**

→ They are Liable to Surgical ectomy, because the mucous Secretory glands don't secreat into the crepts, so the Foreign bodies accomulate in the crepts Causing inflamation, moreover, these Crypts are deep narrow and Branching.

* **Tubal Tonsils**: In eustachian tube.

* **Abdominal Tonsils**: The appendix

- M cells bring Antigens to the lymphocyte (APc).
- the BAIT and GAIT, both belonge to MAIT.

* Tonsils:

- the ~~lg~~ Lining epithelium is of 2 Types, stratified and pseudo-stratified.
- the Crepts are of 2 Types, branched and not branched.
- the branched crepts are Liable for inflammation.

* The Lymph Node :

- with HX and iosin : every thing will appear except the reticuler Fibers.
- with silver stain: the reticulor Fibers only will appear.

* The secondary solitery Follicles / Nodules:

A- The germinal Center:

* Few large Cells

* Its presence reflex the high activity of the cells.

B- The granular / periphry:

* Alot of Small Cells.

* The cells in the germinal center make these small cells and send them to the Periphary.

Antigen + Lymphocyte → Sensitization of B lymphocyte

plasma Cell. ←

Memory cell. ←

... The Lymph node:

- The Compartments of the cortex are incompletly ceperated.
- In the Cortex, there are primary and secondary Lymph nodules.
- Their Function is to Filteration the Lymph

= to protect metastasis ≃ إنتقال خلايا السرطانية

---

* How do you classify the lymphoid tissue?

1) Diffuse = scattered.

always the lymph tissue is related with the reticular C.T.

---

2) Nodules:

1ry → No germinal Center.

2ry → with germinal Center.

3) Aggregated:

payers patches «in the iLium»:

Active absorption + simple epithelium
the first defense Line. ↲

while the second is the lymphoid tissue = the payers patches.
→ GAIT - SALT - BAIT - MAIT they are related to M-cells.
(APCs)

---

* The GAIT and the BAIT belongs to the MAIT. the MAIT is the mucosa associated Lymphoid tissue. The mucosa is the Layer of mucosa, while the mucosa is composed of three Layers, One of these Layers is C.T Containing Lymphoid tissue = MAIT.

---

* The mucous is Found in the GIT and Respiratory tract, so the MAIT is « GAIT, BAIT».

---

* Why the oesophagus does not contain payers patches? because the 1st defense Line there is the Stratified epi. «not simple»

---

* بعض المعلومات الإضافيه من ملزمة يسرى :

- What is the Lamina propria?
It is the Subendothelial C.T.

- Why the blood vessels in affrent Lymphatic vessels are Called the high endothelial blood vessels?
Because they are Lined by simple Cuboidal epitheLium and easily traversed.

- Why is there a pale area in the center of secondary nodules?
1) because it has no density but in periphery is dens.
2) presence of antigen.
3) in the germinal center there are medium size B lymphocytes which are lesser in number (less packed) and Large than the Surronding small size and densely packed B Lymphocyte and moreover, they have paler nuclei.

*) Notes:

- One exposure to antigen, the primary nodules change to secondary nodules.
- The lymphocyte have three types morphologically (small - Large - medium) but Functionaly there are tow types (T-B lymphocyte)

*) Where is the area of abundant T lymphocytes?
in para cortex.

*) Where we have the greatest number of macrophage?
- in the Lung in Case of TB.
- in the spleen > normally > it always active and busy.

*) How do the blood vessels got nutrition?
- intima: directly From blood.
- Media and adventitia: by vasa vasorum.

*) How to avoid Coronary collapse Condition?
- in the males: by donating blood every 3 months.
- in female: this Condition is already Solved by menstral circulation.

*) Notes:
- The endothelium is not necessary related to blood only; Sometimes it is related to water like; eye endothelial area to dehydrate the Cornea; if this endothelial area is not present will lead to apaque vision.

*) All lymphocytes have azurophilic granules, but Some of them also have specific granules.

*) Azurophilic granules have Lysosomal enzymes.

*) Why Lymph nodes transmit Cancers?
- Because they are responsible For lymph Filtration.

*) Why only Lymph node Filtrates the lymph?
- Because the lymph nodes have afferent lymphatic vessels that pass through their sinuses which contain macrophages and others immune cells that modified and filtrate lymph.

*) Why there are not affrent Lymphatic vessels in the tymus?
- Because there are Few blood vessels For the passage of T- Lymphocytes.

*) Is there a Lymphoid tissue in the skin?
- No there's not a Lymphoid tissue in the Skin because it has astrong First Line defence wich is the stratified squamous epithelium keratinized Covering the Skin because.

*) Why there's no Cortex or affrent Lymph vessels in the spleen Like the L.N?
- Do to the presence of Capsule in spleen and because the spleen is related with blood not with Lymph Like the lymph nodes So it is rich with blood vessels not afferent vessels.

.... GIT .... lecture (3) ...

ORAL CAVITY

Structure

- muscle / bone
- Sub-mucosa.
  - Composed of:
  - adipose tissue, minor Salivary gLands.
  - Sometimes absent (in hard palate and gingiva)
- mucosa.
  - epithelium.
  - Lamina propria.

Regions

- vestibule
  - Coverd by cheeks and Lips.
- Oral Cavity proper.
  - Superior region:
    - Hard and soft palate.
  - InF. region:
    - Tongue.
    - Floor of mouth.
  - Ant. region:
    - Teeth.
    - gingiva.
  - post. region:
    - The 3 Tonsils.

Mucosa..

- Structure
  - epitheLium (s.s.E)
    - ortho keratinized (normal keratinized)
    - para keratinized (the nuclei of the Outer layer are very dark)
    - Non-keratinized.
  - L.P.
    - Components
      - Cells.
      - I.C (Fibers, G.S)
    - Layers
      - papillary.
      - Reticula.
    - others
      - (B.v, L.T, N.)
- Types
  - Masticatory
    - Hard palat.
    - Gingiva.
    - they are rough immobile and don't have submucosa.
  - Specialized → Dorsal of the tongue.
  - Lining → all the mouth except the 3 previous regions.
- Functions
  - protection → mechanical (epithelium) and chemical C.T.
  - Secretion → major and minor salivary gland.
  - Sensation → Taste
  - Absorption → Sublingual region.
  - Regulation. → body temperature (special For dogs)

ORAL Cavity ...

The Lip:

structure of lip :-

- It's formed of 3 parts :
1) Exernal part → S.S.K. epithelum.
2) Internal part
3) Transitional area.

* In the Lips there are hair Follicles and sebaceous glands which is a holocrine gland. → Why doesn't it stain ? Becouse its secration is Sebum and it doesn't stain with Hx and E.

* We have two types of Cells here :
1) Stem Cells → divide.
2) Central Cells → die and secrate.

* Then we have in lips adipose tissue orbicularis oris M. which is a skeletal muscle → it's Called the muscle of fascial expression and it's For talking and smiling.

The tongue :

- It has :
1) Core.
2) ventral surface → Smooth.
3) Dorsal surface → rough (Why) Because of papillae → mucosal projections.
4) Lateral Surface → Smooth.
5) Lingual papillae

- The tongue contain:
1) Epithelium S.S.E.
2) mucosal projection.
3) C. T.
4) muscles of the tongue.

ORBICUIARIS ORIS M. : has many directions → it moves the tunge up, down, left, right, Foreward, backward and around.

---

* How many parts do we have in the tongue?
2 parts :
- Ant. 2/3 → and we call it papillary becouse it has 3 papillae.
- post. 1/3 → and we call it Lymphatic " it contains lingual tonsils.
- Sulcus terminals → it seprates the ant. part from the post part.

---

* Linqual papillae → mucosal projections.
- Types of lingual papillae :-
1) Filiform papillae.
2) Fungiform papillae.
3) Circumvallate papillae.
4) Foliate papillae.

---

* Filiform papillae :
- present in the anterior ~~part~~ 2/3 of the dorsum of tounge.
- It's parallel to the sulcus terminalis.
- It's rows «plural» and abundant.
- It's Conical in shape.
- Sometimes it's called christmas tree (why) → becouse it's covered with keratin which is white in color.
- It doesn't have taste buds → it's Function is help in mastication it's direction is toward the ... تلعب [illegible] الـ دور في عليه لحشوناه Pharynx (in ward)
- It's structure is formed of epithelium and Laminapropria → thats why we call it mucosal projections.
- The majerity of its epithelium is thread like (conical)

---

* Fungiform papillae:
- It is Found in the dorsum of the tongue.
- The position → Scattered → present most in the tip.
- Abundance → is less than FilForm papillae.
- Its shape → mushroom shape → Fungus like.
- Why it looks red? Becouse it's rich with Capillaries and the thickness of the epithelium.
- It has taste buds in the dorsum phese → (√) but few.
- Its Function is to help in swallowing.

---

* Circumvallate → ... *تعني محيطه تحفظ براعم التذوق
- It has abig amount of taste buds more than the FungiForm.
- There are glands related to it Called von-Ebner's glands.
- von-Ebner's glands: it's the only which is 100% Cells. and the only which is Small Serous glands.

* parotid glands are big Serous glands.

---

* Foliate papillae:
- It's Found in the lateral of the tongue.
- It's rudimental.

* the taste bud Contain 3 types of Cells:
1- Gustatory or hair Cells.
2- SuStentacular Cells.
3- Base Cells.

*** StratiFied squamous epithelium non-keratinized of Cheeks Can Convert to stratiFied squamous epith. keratinized becouse of Chewing gat and the Friction between gat and epithelium ...

---

* In oral Cavity mention the organs which devoid of Submucosa.
* the gingiva and palate → they are immobile and rough so they don't have submucosa.

* (lymph nodules, palatin tonsils, pharyngeal tonsils) Differentiate Between the epithelium → str. sq. or pseudo str.

pharyngeal tonsils → pseudostratifed.
lymph nodules and palatin tonsils → stratified squamous.

GIT From esophagus to the stomach to the small intestine has 4 layers :-

1) Mucosa : → epithelium → S.S.E non-keratinized.
→ C. T → lamina properia.
→ muscularis mucosa →

* It's stratified in the esophagus becouse of the compression of Food on it during peristalsis.
* In lions it's stratified squamous keratinized.
* Lamina propria → لماذا سميت بهذا الإسم؟
لأنها تعنى الطبقة التابعه لل mucosa. ولوجود طبقة ال Submucosa التي تعتبر أيضاً
C.T لكنها ليست تابعه لل mucosa.

2) Submucosa → Contain lymph nodes, B.vs, adipose tissue and mucus glands.
3) Muscularis externa.
4) Adventitia or Serosa.

* Important information related to the esophagus:

- Why there are few lymph nodes in the Submucosa of esophagus while there are many in the ileum?

Because the Function of mucosa is the protection and it's Formed of 2 parts, the First line defence which is the epiderms (epithelium) and the Second line defence which is the Connective tissue.
So if the First line is stronge stratified then it's ok if the Second line defence was weak like in esophagus, but the ileum is a Sensitive organ For absorption so the First line defence of it is Simple which makes it weak so its second line defence is stronge with present of many lymph nodes in its Submucosa.

---

*If there's stratified squamous epithelium non-keratinized and glands in the Submucosa that means you are in the esophagus. Sometimes esophagus will ConFuse you with vagina but vagina has no glands in its Submucosa and if you Concentrate the epithelium of vagina Contain a big amount of glycogen which is responsible of its acidity.

---

* Why there are glands in the Submucosa of esophagus?
to protect it From the acidity of the Stomach in Case of reflex.

* In esophagus there are 3 parts:

- The upper 1/3 → It's skeletal muscle.
- The middle 1/3 → It's mixed.
- The lower 1/3 → It's Smooth muscle.

---

*muscularis externa: Outer longitudinal skeletal m.
between them Auerbach's Plexus.
Inner Circular smooth m.

GIT TUBE

GIT tube → start from esophagus to anus.
The begining is stratified squamous epithelum non-keratinized, the end is the same and the middle is simple epi. So we call it Sandwich.

GIT is formed of 4 layers:

1* Mucosa: it is formed of 3 layers:
- A. Stratified Squamous. epi.
- B. Lamina propria.
- C. Muscularis Mucosa.

2* Submucosa:

Most glands of GIT tube present in Lamina propria but in the mouth the majority is present in Submucosa.

3* Muscularis externa:

Formed of 2 layers:
- A. Longitudinal m. → Outer.
- B. Circular m. → Inner.

4* Serosa or adventitia.

*** The muscularis externa in the stomach is formed of 3 Layers → obliq, Circular, ~~longitats~~ longitudinal m.m.

* C.T is
  - → lamina propria.
  - → Submucosa → Cells, lymph.T, Small Brs, lymph. vs. veins, Glands.

* The site of glands in:

Oral Cavity → Submucosa.
Tube → Lamina propria.

* Epithelium of GIT is 3 types:-
- non - keratinized.
- keratinized. → parakeratinized. / → Ortho keratinized.

---

* The submucosa of the Oral Cavity is small and the Submucosa of the ~~Oral~~ & esophagus is very big.

---

* The events that happen in 1st week of interuterine life:
1) Fertilization.
2) Cleavages
3) blastocyte Formation.
4) Implantation.

---

* In the 2nd week 2 layers are formed:
- Ectoderm and mesoderm → How?

* What's the fate of empryoplast and trophoplast (inner cell mass)? Change into ectoderm and endoderm.

Notes:- GIT arise from endoderm and its glands arise from meso derm.
- Most problems of esophagus in lower 1/3.

---

* which will form the mesoderm in the 3rd week?
The epiblast and hypoblast.
epiblast → (ectoderm) will form mesoderm.
hypoblast → (endoderm) it disappears in the 3rd week and epiblast then will form a new endoderm so epiblast finally will form endoderm and mesoderm.

* After the Formation of intraemberyonic mesoderm we can call epiblast ectoderm.

---

* What do we call the epithelium if it was in the surface and Lamina propria?

In surface → Surface epithelium.
In lamina propria → we call it Glands.

Note: The Glands are extensions of epithelium.

---

* Why the epidermis of the skin doesn't form glands?

- Becouse it's stratified squamus epithelium keratinized and this type of epith. can't form glands or secrate the secrations.

→ Simple can secrate.
→ Stratified can't secrate.

* Glands of lamina propria → for few secrations.
* Glands of submucosa → for more secrations.

---

* Is there Glands outside the GIT?

Yes, like parotid glands, submandibular glands, sublingual glands and pancrease and liver.

---

* Liver is an extension of surface epith. which Form hepatocytes and cells of pancrease.

---

* What type of epithelium in the :-

(1) esophagus: S.S.E. keratinized (why) → for friction due to peristalsis.
(2) Stomach: Simple Columnar epithelium. (why) → Becouse it is an important part for secration.
(3) Small intestine: There are villi and goblet cells for absorption so it should be simple in the brush border.

(4) large intestine:

It is simple epithelium For absorption and there are large amount of goblet Cells For mucus secration.

Secration, absorption → Simple.
protection → Stratified.

* The Lamina propria:

- The most important lamina propria is Found in the Stomach.
- There are Few glands in the lamina propria in the begining and end of esophagus.
- In the L.p of the intestine there are intestinal glands or Crypts (إخفي) of Lieberkuhn.
- Folds are Formed of mucosa and submucosa and they are temporary → they get extended and Fallen in swallowing.
- the C.T of the L.p Contain:- C.T Cells, Collagen and elastin Fibers, glands, Loose areular C.T, Small Bvs., Solitary Lymph nodules.

* ileum → has simple epithelium with many lymph nodules.
* esophagus → has stratified squamus epithelium with Few lymph nodules. (why?)
Becous the First line defence in esophagus is strong and in the ileum is weak.

* why do we have submucosa Containg glands in the esophagus?
Due to regurgitation (reFlex) of acidity From the stomach to the esophagus which may lead to CanCer.

* why the duodenum and esophagus are the Only wich have glands?
Becouse they are located near of the stomach (HCL) so mucus glands have neutralization affect to the acidity of stomach.

MUSCUIARIS EXTERNA :-

(1) Outer longitudinal muscle.

(2) Inner CirCular muscle → we know it From the direction of fibers, the 1st 1/3 of the muscle is skeletal m., the 2nd 1/3 is mixed and the 3rd 1/3 is smooth m.

* Most problems Come From the last 1/3.
* if we see the Circular m. is the Outer and the longitudinal m. is the inner that mean there's a mistake in the section.

* then we have below it ADVENTITIA or SEROSA.

---

* How we differentiate between the ducts and B.vs?

Duct → is Cuboidal epithelium in it's wall.

B. vs → is Squamous epithelium in their walls.

---

* How to differentiate between the arterial and venule?

Arterial → has thick wall and circular in shape.

Venule → has thin wall and irregular in shape.

---

* There are 6 types of Cells in the Stomach, So most problems of stomach happen From those Cells.
* The Surface epithelium of the stomach Contain Crypts, between one crypt and another there is a gastric gland.
* There's no mucosal glands in the Submucosal of stomach (why?)

Becouse the presence of many cells in the stomach which Secreat enough amount of mucus, So no need For glands in the stomach.

---

* The Stomach is devided into 3 important areas:
(1) Cardiac area.
(2) pyloric area.
(3) Fundic area.

* all them secrates mucus but the don't have glands they depend on the Surface cells.

---

* what's the difference between epithelium of vagina and esophagus?

Both of them are stratified squamus epith. non-keratinized. But the vagina has many Glycogen permentations to form lactic acid which makes the vagina acidic, while esophagus doesn't have Glycocen, so no effect.
In addition the esophageal gland present in submucosa.

– سـؤال من عام 1999 –

* Mention the organ which contain all the types ~~except~~ of Cells?

Stomach ...

(1) Fundus → Contain all types except on

(2) Surface mucous Cells → the 1st cell which secrates mucous and contain mucous granules, it present in the Surface Cell.

(3) mucous neck cell → Secrates acid mucus unlike the neutral mucous Formed by Surface mucous Cell. it present in the glands.

(4) Chief Cell (peptic cell) → it Secrates many enzymes due to presence of Zymogen granules Containing enzymes in its apical part.
it's present in the lower part of Fundic glands.

(5) parietal Cells or oxyntic cell → Contain intracellular Canaliculi and numerous microvilli. the Contain many mitocondria (why)
↓

Becouse the Formation of Hcl is an active transport
- they Secrate Hcl and intrinsic Factor → antipernicious anemia which caused by vit. B12 deficiency.
- they present in the upper and middle portions of glands Scatered between the mucous neck cells and cheif Cells.

---

* What's the difference between the Oxyntic Cell and oxyphil cell?
- Oxyntic cell → parietal Cell → has many mitochondria and responsible for formation of Hcl.
- oxyphils → present in the parathyroid glands, it has many mitochondria with unknown Function.

(5) Stem Cells or Argentaffin, Chromaffin, Entro-endocrine Cells or APUD Cells → this type is endocrine becouse they Secrates the mucous to the base of the Cells into the C.T.

Notes:
- Canaliculi Contain macrophages in the active parietal cells
- In inactivation parietal Cells the macrophages of the Canaliculi disapper inside vesicles.

Mantion the Cells which Can't divide:
(1) Nerve Cells → Can't divide or repair.
(2) Cardiac Cells → Can't divide but they repair by Formation of Fibers
(3) Skeletal Cells → Can't divide but they are repair by Satellite Cells.

* Hyperphegia → alot of eating non-stop.
* expacting questions in the exam:
- talk about the epith. of esophagus and the glands in it's Submucosa
- talk about the submucosa in the doudenum and esophagus.
- talk about the gastric glands of the stomach.

---

* Stomach has alot of Secretion Cells :

(1) Mucus SurFace Cells - SCE
- No brush border
- pale in Color why becouse of mucous Secreation
- Nuclei
- RER
- Mitochondria located basaly.

Chemicaly mucous is glycoproten → protein from RER.
→ Nucileules → Ribosom.

---

(2) Neck cells - pale nuclei basal located.
- Nucileules → Ribosom.

Stomach doesn't has in Submucosa mucus (Why)
Because it is depend mainly in surface Cell.

---

(3) Cheif Cells - Secrate Zymogen granules.
- present alot of RER.

(4) parital cells - SER
- Many Canaliculi and microvilli.
- Macrovilli appear when Cell is active, When the cell is not active they disappear and convert into tubulovesicales.
- alot of Mitochondria (Why) Becouse of active transport.

(5) Stem Cell:
For formation another Cell.

(6) Argentaffin Cells: (unicellular endocrin gland)
The granules located basaly why to go → C.T → blood to Secrate Hormons.

---

*Muscles of Stomach:

(1) inner oblique for mixing and movement of food
(2) middle Circular.
(3) outer longitudinal

- all muscle of Stomach is a Continution of esophegeal Muscles and man intestine.

* The main Features of SI is villi.

* Comparision of part of SI in term of:

	Duodenum	JaJunum	ileum
(1) goblet Cell	few	more then duodenum.	more then duodenum and JeJunum.
(2) plicae Circulares	1		
(3) Shape of villi	leaf like	long (leaf like)	Short (Finger Like)
(4) Content of Submucosa	Brunners gland	No Brunner neither nor payers patch	payers patch

*To increase Surface area of SI by :

(1) plicae Circularis.
(2) villi
(3) Crypts
(4) microvilli

- the plicae circular is formed by mucosa and submucosa.

- The goblet Cells increas gradually From duodenum → Jejunum → ileum → Large intestine ... (why) for libricaton.

- The plicae Circularis decreas gradually From duodenum → Jejunum → ileum.

- The paneth Cells present Only in Small intestine.

- villi, microvilli, Crypts, plicae CirCularis → for increas SurFace area.

-Large intestine is character by (taenia Coli) which is Shorter than the tube and for this reason ∴ the Sacculations appear.

---

* The ducts of Paranchyma of Salivary gland :

1- intralobular duct : → the most important.
Consist of → intercalated duct.
2- Interlobular duct : → Straited duct.
3- interlobar duct :
4- Main duct :

---

* The striated duct is So name → becouse the Saliva here undergo modification.

---

* There are 2 types of Salivary glands : (Major and Minor)
The Major are 3 (parotid, Submandibular, Sublingual)
parotid → Serous gland, drain through stensen's duct.
Submandibular → Mixed Serous and mucous with predominance of mucous Cells, drain through wharton's duct.
SubLingual → Mixed Serous and mucous with predominance of mucous Cells, drain through multiple Small ducts.

- The Minor Salivary glands → 500 units in Submucosa.
  → not present in gingiva.

---

* The Serous acini → watery Secretion.
  → Darkly stained.
  → has rounded nucleus between Center and base.

---

* The Mucous acini → mucous «glycoprotein» Secretion.
  → pale staining.
  → The acini is Surrounded by myoepithelial cells.

---

* The Seromucosa acini → It is mucous acinus with a Cap of Serous Cells Called « demilunes »...

---

* you Can differentiate between Serous and mucous acini by 9 things:

(1) Size of secretory units.
(2) Lumen.
(3) Nucleus.
(4) Staining.
(5) product.
(6) RER.
(7) GA
(8) Secretory vesicle.
(9) Tight junction.

All types of epithelial protect but there protection various:

- Stratified epithelial: st. Sq. protect Large extent.
- Simple epithelial: Simple & columnar Secret and protect by tight junction between its cells « Smaller extent protection »

GIT
GLANDS

How many types of Salivary glands do we have?

2 types:

1/ Major salivary glands:

- Parotid glands → are Serous glands (big Serous glands)
  para ear → موازيه للأذن ← تلفيه
- Submandibular glands → are mixed glands but mostly serous.
- Sublingual glands → are mixed glands but mostly mucas.

2/ Minor salivary glands:

They are found in the submucosa of oral Cavity.

- labial glands → Found in the lips.
- buccal glands → found in the buccals (cheeks).
- lingual glands → Found in the tongue

What's the area which doesn't have glands?

Gingiva.

* palate → has in different areas and in small amount.

Note * Saliva differs during the Changing time of the day (morning, afternon, evening)...

What's the difference between Parenchyma and Stroma?

- Parenchyma is the Functional unit, it's represented by Secratory unit and duct.

which ducts are intralobular (present in lobules)?

- Intercalated duct and striated ducts (intralobular ducts).

why the lobules have stricted ducts?

- Becouse of their modification.

Striated ducts are Found in two places. (where) Q → in exam.
1/ in the Salivary glands → For modification.
2/ in proximal Convoluted (renal) tubule → for reabsorption.

What are the two areas which have glands in their Submucosa? (Esophagus, dudenum)

What are the myoepithelial Cells?
- They are Contractile Cells present around the acinus.
- Their function is For Contraction to move the Secretion to outside.

Why we need modification in the mouth?
- to Change the Saliva Concentration From isotonic to hypotonic.

Where exactly the myoepithelial Cells Present?
- Between the lining Cells and their basement membrane.

the myoepithelial Cells:
They are present in the skin, Salivary glands, Sebaceous glands and sweat glands but they are not present in the pancreas.

Why the pancreas doesn't have myoepithelial Cells?
Becouse we don't need modification in pancreas its secretion goes out directly. becouse there are two hormones which are Secrated by intestinal Cells Causing the acini to move their ~~Secretions~~ outside.

How many differences do we have between the mucus and Serous glands? There are 9 differences between them.

* We mentioned them in the previous lecture.
* They are very important in the exam → MCQ or essay.

PANCREAS:

- It's a mixed gland → exocrine and endocrine.
- The exocrine portion of pancreas is simillar to parotid gland → Both of them are serous but pancreas doesn't have myoepithelial Cells and its striated ducts are not that degree of parotid gLand.
- pancreas has 7 types of Cells → the most two important cells are α - Cells and β - Cells.
- In Case of low insulin secretion → Cause hyperglycemia which leads to diabetes mellitus

Mel → means honey, this to differentaite between it and diabetes insipidus.

- β - Cells → Secrate insulin → it helps in transformation of glucose to glycogen.
- α - Cells → Secrate glucagon.

LIVER:

- It's all lobules.
- There are 3 Classifications of lobules in Liver: (مهم)

(Classical lobules, portal lobules, acinus lobules)

Classical lobules:

They are Composed of Central vein and six Corners (hexagonal) which Contain portal areas or Called triad

Triads Contain:
- hepatic artery branch.
- portal vein branch.
- branch of bile duct.

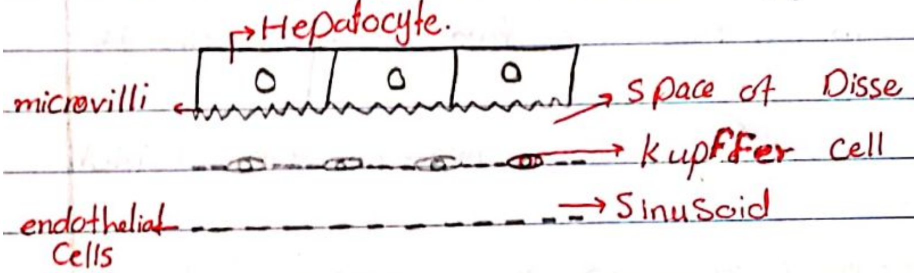
The difference between them:

thick spherical artery.

thin vein.

simple Cuboidal epith. duct.

- veins in the Liver → rich with nutrients which come from the GIT.
- Arteries → are rich with oxygen.



The sinusoid is a type of blood capillaries.

- There are three types of blood 〃 :

1/ Continous : - it is rounded by pericytes.
- it doesn't have openinges
- it's present in (BBB) Blood Brain Barrier.

2/ fenestrated : - it is rounded by pericytes.
- it has openings.
- it's present in endocrine glands.

3/ sinusoid : → related with kupffer cells., present in liver.

* Sinusoid located between the hepatocytes.
* hepatocytes Contain microvilli.

The blood get out from the openings of sinosoids to aspace between the sinusoids and hepatocytes which called space of Disse.

What are the Contents of the space of Disse?

1/ microvilli.
2/ Adipose Cell of Ito.
3/ Stellated - shaped pit Cells.
4/ Reticular fibers.
5/ unmyelinated nerve axons.
6/ Blood plasma.

There are two types of nuclei in the Liver:
- light nucleus → hepatocytes.
- Dark nucleus → kupffer Cells.

kupffer Cells:
- They are phagocytic Cells and considerd macrophages → part of macrophage system.
- They Can break down RBCs although that happens in the spleen.

What's the difference between the classical lobules and portal lobules?
Classical lobules: the Central vein present in the Center.
portal lobules: the Central veins present in the peripheral.

Would you prefer to look at the liver at Something Classical or Something portal?
It depends on my interest.
ex: if I want Search about the bile secretion I have to look at the Liver in portal → because the Bile ducts present in the center of the portal lobule and the direction goes in a middle direction → like the Serous glands.
«So we can Consider the portal area as the Secretory unit of liver»
* The blood Circulation and bile circulation have opposite direction.

ACINUS LOBULES:

- They are diamond in shape Connecting between two Central veins and two portal veins.
- There are Capillaries which Cover the middle of the acinus lobule → vascular Core.
- The vascular core presents between the 2 portal veins.
- This vascular Core is Subdivided the acinus lobule into 3 Zones (HOW) → according to the nearest area which takes more blood supply then the others areas → means Zone 1 is Supplied first and then Zone 2 and after the supplying of both of them Zone 3 is Supplied.

- In abusing the liver, Zone 1 is the first affected area.
- In fasting, the 1st Zone is the 1st one to give it's glycogen.
- The 1st one which is filled with fat is the 1st Zone.

بعض المعلومات الإضافيه من ملزمه الدكتوره يسرى المخلافي:

(1) The vestibule is Coverd by wet What?
Cheeks and Lips.
(2) Mention the Fourth tonsil?
tubal tonsil of auditopharyngeal tube.
(3) What is the Soft tissue of oral Cavity?
- Mucosa (epi. - C.T)
- Submucosa.
- Muscles.
(4) What is the differences between epiderms and epithelium?
The epidermis was epithelium befor it becomes epidermis (epidermis is the epithelium Covering the skin.

(5) Why is the enamel dead tissue?

Because the amyloblast Cell made the enamel epidermis then die so it is Considered as a dead tissue.

(6) What is the difference between orthokeratinized and parakeratinized?

Orthokeratinized → ordinary or normally keratinized.

parakeratinized → looks like keratinized but they are not.

(7) Why the oral mucosa is stratified?

To resist friction and they are may be 30 layers.

(8) What is the difference between intrinsic and internal?

Intrinsic → a component of the main structure.

Internal → in position (inside).

(9) What is the Sensation and Sensitation?

Sensation → الإحساس

Sensitation → التحسس

(10) Are there smooth muscles in the cheek?

Yes, there are smooth muscles of blood vessels.

(11) Notes:

There are elastic fibers in the cheeks which move it away from the teeth during eating.

- There are many minor glands in the Submucosa, about 500 glands

(12) Why is the [illegible] gingiva dehydrated area?

Becaues it without Submucosa so no intrinsic glands, as a result, it is dehydrate and not mobile.

(13) Why the drugs of angina are used under the tongue

Because it is well wet, thin translucent as it's Covered by non-keratin epithelium, also it is highly absorptive area due to its high vascularity, having large veins and they are drained to the superior vena cava by passing the longe Course of GIT. So, drugs are directly absorped to the heart.

(14) what is the taste? and why people eat alot with it?
- The taste is the sensation of the gustation of the different types of foods.
- Because the taste sense stimulates the appetite center in the hypothalamus which increases the food intake.

(15) Why lymphoid tissue is increased in the ileum? why not in the Jejunum?
-Because the absorbance of benefit nutrients occurs in the jejunum, so the remain toxic and non-absorbed substances will go to the ileum, so we need more lymphatic tissue in the ileum for protection.

(16) why are the merocrine glands Called eccrine?
Because they present in the ectoderm.

(17) What is the importance of the fibroblast in the lamina propria?
For building the tissue's intercellular substance.

(18) What are the defense cells in the lamina propria?
macrophage, lymphocyte, lymphoid tissue.

(19) What is the difference between smooth and soft?
Smooth is a characteristic of the surface only, but soft when we can compress the thing we call it soft.

(20) How is the regulation of the body temperature going?
By evaporation of sweat and saliva (only in animals)

(21) What is the linea alba and where it can be found exactly in the oral cavity?
It is an elevated line of keratinized epithelium may be formed in the buccal mucosa at the level where the maxillary and mandibular # teeth occlude.

(22) yellow spots may be seen in oral cavity, explain?
wrongly displaced sebaceous glands in oral mucosa during emberyonic development then they form deposits of sebum.

(23) why do von Ebner's glands have serous secretion?
To help to wash the crypts of Circumvallate papillae to enable that taste buds to response rabidly to the other Stimulants.

(24) Lips are very sensitive area, explain?
Because this area has higher cerebral representation due to numerous receptors.

(25) There are three types of mucosa:
Masticatory - mobile.
Lining - immobile.
Specialized - immobile.

(26) Why there are no glands in the Submucosa of stomach?
because the cells in the mucosa secrete mucus and it is enough for protection.

(27) Why there are alot of mucous glands in the esophagus and duodenum?
for neutralization of the acidity Because they are neighbors of the stomach. In addition, the mucous act as alubricant especially in esophagus.

(28) the wall of the stomach:
mucosa : epith. - simple Columnar.
lamina propria - contains glands.
muscularis mucosa (interna) : inner circular, outer longitudinal.
Submucosa.
muscularis externa - 3 layers : inner oblique, middle circular, outer longitudinal.
Serosa - mesothelium. "the bare area of the stomach is coverd by adventitia"

(29) what is enteroendocrine cells?
- there are endocrine cells in the stomach and secrete hormones.
- It has other names : ABUD Cells, Chromaffin cells, and argentaffin Cells.

(30) Notes:
*parietal cells can't divide and after four days they die, so there are stem cells to regeneration.

- There are 4 structures to increase surface area for absorption in the Small intestine:

plicae circularis → Submucosal folds.
villi → mucosal folds.
Microvilli → Cytoplasmic projections
~~It~~ Intestinal crypts → invagination in the mucosa (epithelium+ L.p)
= Simple tubular glands.

- villi are Composed of the Central Core of dense. areolar C.T which contains:

1. lymphocytes.
2. Fibroblasts.
3. Smooth m. : derived from the muscularis mucosa (interna)
4. Arterioles, Capillary loops, venules.
5. lacteal (bind end lymphatic vessel).

villus Covering epithelium:

1. Enterocytes.
2. Goblet Cells.
3. Argentaffin (entero endocrine) Cells.
4. Caveolated Cells.
5. M Cells (only in the lining of the of; the very short villi which overlies payers patches of the ileum.

(31) What are the Cells which found in lining of the crypts of lieberkühn?

- Columnar absorptive Cells.
- Goblet Cells.
- paneth Cells.
- Argentaffin (entero endocrine) Cells.
- Stem Cells (undifferentiated Columnar Cells).
- Caveolated Cells.
- M Cells

(32) How can you differentiate between serous and mucus secreting cells?
The mucus can't be stained with HxE but the serous can be.
- the Serous found in the epithelium but the mucus found in submucosa for neutralization.

(33) Differentiated between duodenum, jejunum and ileum?
duodenum has Brunner's glands which secret mucus to protect it from acidity of stomach.
- jejunum has no Burnner's glands neither peyer's patches.
- ilium has peyer's patches, no Brunner's glands.
* the goblet cells increase distally in the small intestine.

(34) There are another type of mucus cells in the stomach which called mucus neck cells and found in the neck of the fundic glands and secrete acidic mucus, why?
- Un known.
This cells are intermediated between stem cells and peptic cells.

(35) Why are there greater numbers of goblet cells in the large intestine?
for lubrication and facilitation of the defecation and also.

(36) Why we say the pancreas is mixed gland and don't say unicellular?
because each mixed unicellular cell is endocrine and exocrine, while the pancreas in which the endocrine cells are separated cells from exocrine cells.

(37) Why the GA is more developed in the mucus secreting cells than in the Chief?
Because its function in mucus secreting cells is to add CHO to the mucus but in the chief cells its function is just packaging of secretory granules.

(38) what are the parent cells in the stomach?
the parietal cells.

(39) Notes:
- The stomach has microvilli in its parietal cells.
- The serosa protect our body from metastasis.

-The Corium = lamina propria, we use the Corium when the epithelium is in contact with C.T in a projection.

- PAS = Periodic Acid Schiff is used to stain (glucogen, mucus, cell membrane)

(40) Which cell type has tight junction, mucous or serous and why?

Between serous cells for protection from enzymes, while the mucous cells aren't degenerated by enzymes.

(41) Kupffer cells have dark nuclei while hepatic cells nuclei are light, why?

-The darkness means less activity but the macrophage nucleus become light in the presence of antigens because it will form more lysosomes.

(42) What are protective ways of GIT?

- St. sq. ep. and mucous of submucosal glands in the esophagus.
- mucus membrane in the stomach exerts mechanical and chemical protection.
- mucus of Brunner's glands is for lubrication and protection against acidity.
- Immune response by APCs (antigen presenting cells), lymphocytes ... ect.
- Reactions of leukocytes, eosinophils ... ect.
- Lysozymes and defense of paneth cells.
- Barrier of tight junctions between enterocytes.
- Rapid epithelial regeneration.

(43) Goblet cell isn't stained well, why?

Because it secretes mucus which is dissolved in HxE staining preparation.

(44) What are the tissues without submucosa?

Gingiva.
Gallbladder.
fallopian tube.
vagina.
Urinary bladder.
Hard palate.
Ureter.

(45) Why are parietal or oxyntic cells so called?

-parietal because they don't reach the lumen of fundic gland.

- oxyntic because they are acid forming cells.

(46) Numerous microvilli are seen in the stomach, where and when?

-In parietal cells when they are secreting.

(47) why during liver cirrhosis the lobulation becomes marked?

Due to the conversion of it's cells to fibroblast like cells thus start depositing fibers causing increase trabeculae thickness.

(48) Explain how the saculation of colon are formed?

- The tenia coli bands are shorter than the colon.

(49) The parietal cell is rich in mitochondria to provide great amount of ATP needed for the active transport of Cl and H ions to form HCL.

(50) If the goblet cells in the large intestine below the normal, the constipation will occur.

CVS

Heart mean white.

*All blood vessels Composed of 3 layers:

1) TUNICA INTIMA: (also Called tunica interna)

is simple squamous epithelium surrounded by a connective tissue basement membrane with elastic fibers. it is closer layer to the blood.

This layer made up of 3 layers:

A. endothelium « simple sq. epi. » → this layer must be smooth any roughness will lead to accumulation of platelets.

B. Sub endothelium → «Support only»

C. internal elastic lamina → not clear Cos the environment above and below it is elastic membrane which is not clear.

2) TUNICA MEDIA:

It is the thickest layer and the most important layer of the artery because it contain the elastic fibers.

3) TUNICA ADVENTITIA:

Contain vasa vasorum.

---

* There are three main types of arteris:

- Elastic a.a.
- muscular a.a.
- Arterioles. a.a.

---

* Small and middle size of arteries have from 7-40 layers of muscles while the arterioles Contain 6 or less layers.

What is the Source of nutrition to large arteries?

1) The first half is supplied by vasa vasorum.
2) The rest supplied by blood directly.
→ the last one pathway is risk due to enterance of Cholesterol and accumulation it will lead to thrombus → ischemia → hypoxia.

Function of arterioles:

- prevent collapse of blood Capillaries.
- Control of the blood pressure.

What differentiates muscular arteries from elastic arteries?

- Elastic a.a Contain large number of collagen and elastin fillaments in their tunica media than muscular arteries do, giving them the ability to stretch in response to each pulse.
- Elastic a.a include the largest arteries in the body, those Closest to the heart, and give rise to the smaller muscular a.a.

Why Cholesterol level difference between female and male?

young women tend to have lower lDl levels than young men and, from puberty on, women tend to have higher IDL level than men. When estrogen production declines after menopause, women's good levels decrease greatly. Also, after the age of 55, women tend to have higher bad level than men.

Types of Capillaries

1. Continuos → No pores
→ Connected by thight junction.
→ present in BBB.
→ Present at most of the body.

2. Fenestrated → have pores.

→ Always accompany by pericyte «perivascular» that is important for repair. and responsible for scar appearance.
→ the pores are needed for hormons and filtration.

3. Sinusoid → have pores
→ at liver, spleen, B.M, L.N.
→ guarded by Macrophage.

Note : the tunica adventitia is the most important layer of vein.

What are the two types of Capillaries?
- true Capillaries → which branch from arterioles and provide exchange between tissue and the Capillary blood.
- Sinusoid → a type of open-pore capillary found in liver, bone marrow, anterior pituitary gland, and brain circumventricular organs

*Why the muscular media so Called?

-Because this middle layer Contains a huge amount of elastic Fibers which are Controlled by ANS « when works it make V.C or V.D.

---

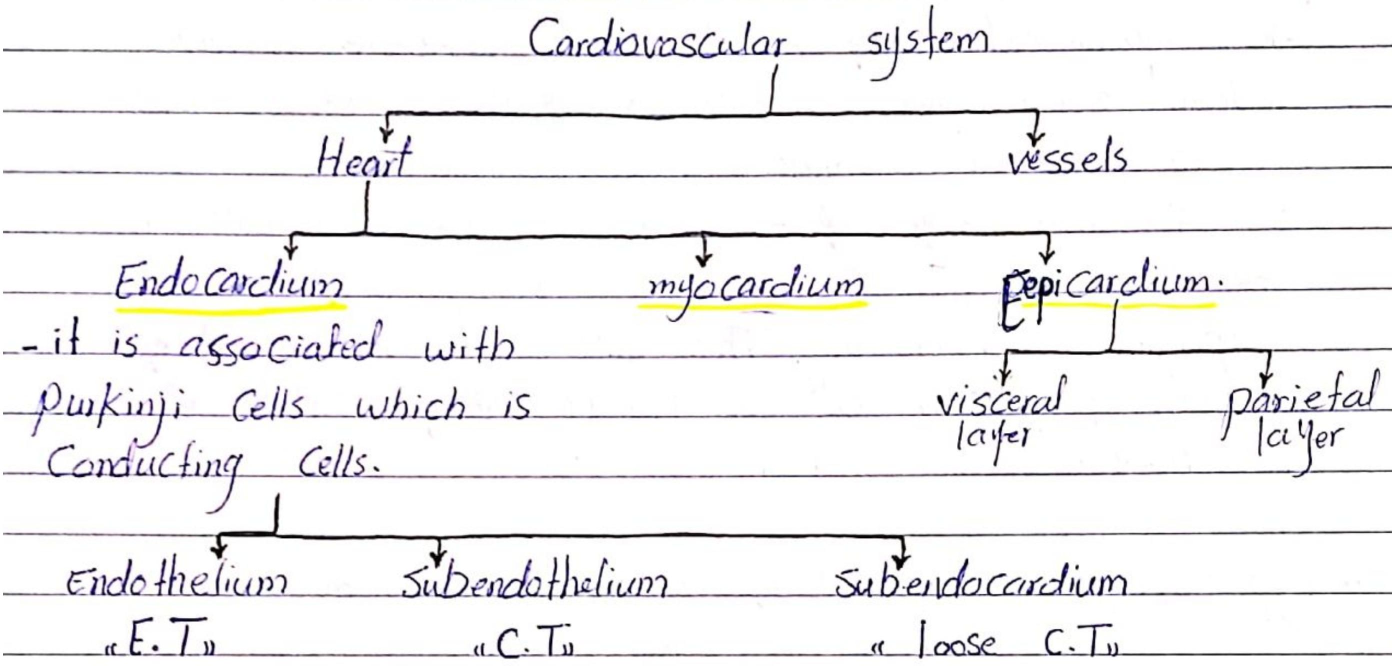
* Aorta is 70% elastic fibers and the rest is Smooth muscles.

---

* The difference between smooth muscle and elastic fibers?

- Smooth muscles → its fibers are living.
- elastic fibers → its fibers aren't living.

CVS


Cardiovascular system
Heart
vessels
Endocardium
myocardium
Epicardium.
visceral layer
parietal layer
Endothelium «E.T»
Subendothelium «C.T»
Subendocardium « loose C.T»

- it is associated with Purkinji Cells which is Conducting Cells.

---

* Between the Cardiac Cells, there are intercaletad discs which Composed of 3 elements and One gap.
* the differences between the 3 types of muscles:
  «See the table in the muscle Chapter»
* There is amain difference between Cardiac and Smooth mm. which is « There is a pale region around the nucleus Called juxtanuclear region." or Perinuclear region.

---

* Why it's pale and what are its Component?
- it is pale because it has lipofuscin pigment granules that isn't stained with H.E. Its components are: mitocondria, Golgi apparatus, lipofuscin pigment granules and Glycogen. « the answer is taken from Ross page 328»

---

* What is the Contraction?
- It is the Shortening of the Cell.

* Sarcoplasm isn't developed in the heart. Ca^{++} Comes from extracellular. (How)?

- the depolarization of the T tubule membrane activates voltage - sensor protein, which are similar in structur and function to Ca^{2+} channels.

In the frist stage of the cardiac m. contraction, Ca^{+2} from the lumen of the T tubule is transported to the Sarcoplasm of cardiac m. This Ca^{+2} causes massive and rapid release of additional Ca^{+2} that initiates subsequent steps of the contraction. « the aswer is taken from Ross Histology page 330 »

* Hypertrophy : Enlargement of an organ from the increase in size of its cells.

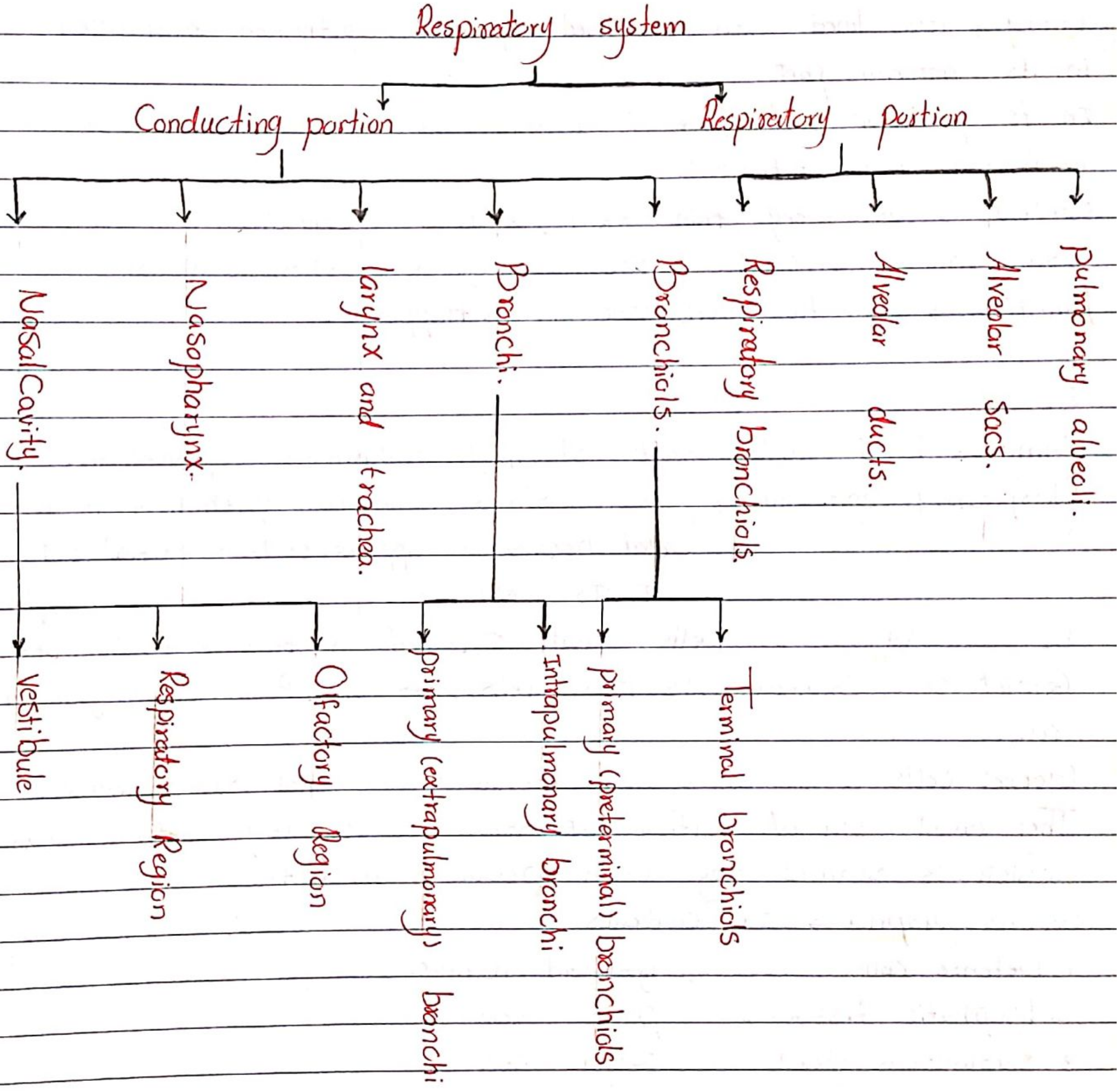
1. In sk. m. → physiological
   occur by exercise (Healty phenomenon)
2. In cardiac m. → pathological
   The cells are died.

* What is the relation between hypertrophy of cardiac m. and cell death ?

- The relation is when the volume of the cell is increased forexample → 3 times. So, the nutrition that pass through the cell membrane. due to increased of surface area 2 times. surface area that increased for 2 time isn't enough for the volume of the cell components. This causes the cell death.

*** The slide that prof. SMS talked about it (the differences between artery and vein) is in the next page.

Respiratory system


Respiratory system
Conducting portion
Respiratory portion
Nasal Cavity.
Nasopharynx.
larynx and trachea.
Bronchi.
Bronchiols.
Respiratory bronchiols.
Alveolar ducts.
Alveolar Sacs.
pulmonary alveoli.
Vestibule
Respiratory Region
Olfactory Region
primary (extrapulmonary) bronchi
Intrapulmonary bronchi
primary (preterminal) bronchiols
Terminal bronchiols

* Nasal Cavity:

1] vestibule:

Lining → it's lined with stratified squamous epithelium keratinized in its anterior part.
In its posterior part, there is a thin line of stratified squamous epithelium non-keratinized.

Contents → as every thin skin, vestibule contains:
1) stiff hair (vibrissae) 2) Sebaceous glands 3) Sweat glands.

function → of the vibrissae is « trapping ».

2] Respiratory region:

Lining → lined with pseudo-stratified Colummnar epithelium.
(Respiratory epithelium) → pseudo-stratified Colummnar epithelium is so Called because it appears to be stratified but IT IS Not.

The main type of cells that present in this epithelium are:
Goblet Cells, Columnar cells, Basal Cells, Dnes cells, Brush cells, granular cells.

Goblet cells → are unicellular exocrine glands that secret mucus.
They aren't stained with H/E stain, because they Contain mucus which is stained only with special stain (pAs)

lamina propria → It contains:
1. Defense cells → lymphoid nodules. / plasma Cells. / Mast Cells.
2. lymphatic tissue.
3. Seromucous glands.
4. Blood vessles.

- If there is a cartilege under lamina propria, the deep layers are lined by perichondrium.
- If there is a bone, lamina propria is lined by periosteum.

3] Olfactory Region:

Site → Roof of Nasal Cavity.
Lining → pseudo - stratified Columnar epithelium.
Types of Cells they Contain:
1. Olfactory Cells → Bipolar cells.
2. Supporting (sustentacular) cells.
3. Basal Cells (stem cells) → pyramidal - shape.
Lamina propria → it's fibroelastic tissue that contains glands secret serous secretion which keeps lamina propria wet. (for transporting of olfactory stimuli)

* There is a region in the nasal Cavity Called Allergic region which contain:
1. Mast Cells → responsible for histamin and contain FC Receptors.
2. plasma cells (antibodies).
3. Esinophils.

Histology

Blood

*Define blood?

It is a specialized connective tissue composed of plasma and Cells.

Note → this definition is correct 100% but its evaluation is Zero

Why? Because this definition doesn't mention the platelets which are fragments but not cells.

Components of blood

- fragments (platelets)
- plasma
- formed elements
  - RBCs (erythrocytes)
  - WBCs (leukocytes)
    - Granulocytes
      - neutrophil
      - eosinophil
      - basophil
    - AGranulocytes
      - monocytes
      - lymphocytes

---

* previous comprehensive question (✓ or X)

* All WBCs Contain Granules (✓ or X)

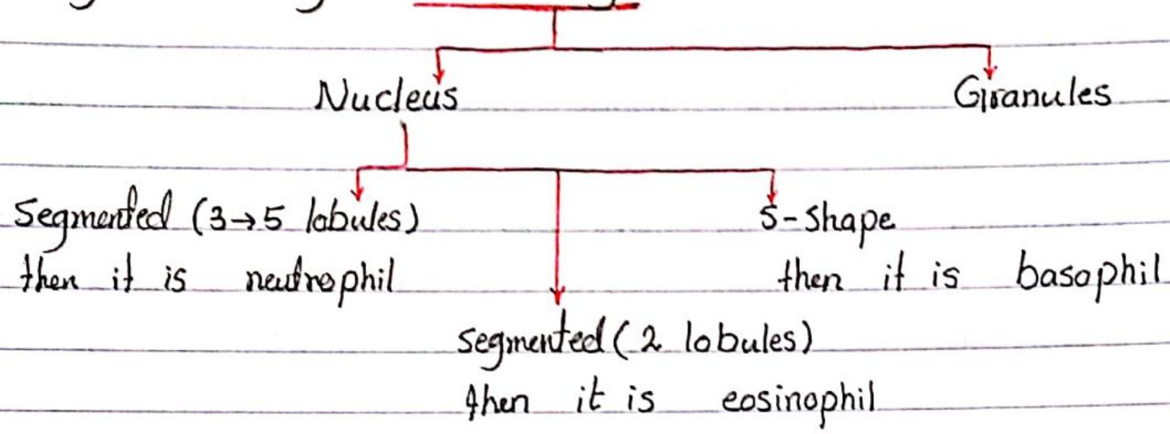
the answer is true ... why?

Because WBCs have two kinds of granules

specific — found in eosinophils, neutrophils and basophils

non specific — found in all types of WBCs.

* How Can we recognize neutrophils, eosinophils and Basophils?
- by observing two things.


Nucleus
Granules
Segmented (3→5 lobules)
then it is neutrophil
S-Shape
then it is basophil
Segmented (2 lobules)
then it is eosinophil

* When the neutrophil nucleus is formed of more than 5 lobules, we Call this Case hypersegmentated and this Case Occurs with aging.

* The S-shape nucleus of basophil is not clear ... why?
- Because it is obscured by granules.

* Stage of formation of RBCs

These are Common steps for all blood Cell types...

UMC
↓
pluripotential Hemopoietic stem cells (pHSC)
↓
Multipotential stem cells
↓
Unipotential stem cell
↓
Erythroid Colony forming unit Cell
↓
proerythroblast
↓
Basophil erythroblast
↓
polychromatophil erythroblast
↓
Normoblast
↓
Reticulocyte
↓
mature RBCs

* What is the most important Characteristic of proerythroblast?

- It has two nucleoli

* Why the two nucleoli are Clear in this stage?

- Because in this Case or stage ribosome formation occurs.
- In the erythroblast stage, the ribosomes are formed, formed, formed until Cytoplasm becomes full of ribosomes and the name of this stage will be Changed into Basophil erythroblast.

* Why Basophil erythroblast is so Called?

- Because its Cytoplasm is full of ribosomes.

- In the basophil erythroblast stage, we need the ribosomes to form a protein Called haemoglobin.
- Ribosomes form haemoglobin, this means blue things forms red things, and because of that mixture of Colors occurs so, then the name of the cell will be Changed into polychromatophil erythroblast.
- At the polychromatophil erythroblast stage, Continuous formation of haemoglobin still occurs until almost all the haemoglobin is available and the name will be Changed into orthochromatophilic erythroblast (normoblast)
- Orthochromatophil erythroblast stage gets rid of nucleus by extrusin « don't say by removal » and the name will be Changed into reticulocyte.

* Why the reticulocyte is so Called?

- Because it has reticulum which is remnant of ribosomes.

* after how many hours the reticulocyte will be Changed into a mature RBC ?
after nearly 24 to→ 48 hours.

RBCs :

*acidophilic → Coz of haemoglobin.
* biconCave → to increase Surface area.
* transport of O_2 and Co_2.
* no nuclei and granules.
* no mitochondrial → Their Supply of energy is from Glycolysis.

WBCs formation

Myeloblast
↓
promyelocyte
↓
Myelocyte
↓
Metamyelocyte
↓
Band Cell

---

* What is the aim of granules ?
- to form protein ... which type ?
specific and non specific granules.

---

* promyeloblast forms non-specific granules (lysosomes).

* Myelocyte starts formation of specific granules.

* Metamyelocyte continues formation of specific granules untile nucleus is formed.
* Band cell is an immature WBC and has unilobed (non- Segmented) nucleus.
* Band Cell is the cell from which 3 granular WBCs Come.
* Basophil produces heparin and histamine during allergy.

- Which Kind of acid found in heparin?
• Sulphate Coz heparin is a Sulphated mucopolysaccharide.

PLATELETS

- Come from megakaryocyte which produce 100 $\xrightarrow{to}$ 200 platelets from its Cytoplasm.
- What is the Source of membrane which forms platelets?
  - SER
- Human platelets are Called fragment Coz they are pieces from megakaryocyte Cytoplasm.
- In Some animals, platelets are Called Cells Coz they Contain nucleus and Cytoplasm.

LYMPHOCYTES

- T and B lymphocytes are formed in bone marrow.
- T lymphocyte moves into Thymus then into L.N and spleen which have a special site called T- dependant zones.
- B lymphocyte moves into secondary lymphoid organs (L. Ns and spleen.

Histology → مراجعه

The Blood is formed of :

1] formed elements → العناصر المكونة

erythrocytes ,platelets leukocytes

2] plasma is a colorless watery fluid of blood containing both cells and in which erethrocytes, platelets and leukocytes are suspended.

(watery fluid)

* Serum → is a Serofluid of the blood that resembles plasma and contain fibrinogins.

* Hematocrit : is the ratio of the volume compiled by the bakaged RBCs to the volume of wholo blood.

* Buffy coat : is a then layer between plasma and RBCs contain WBCs and platelets.

What are the most numerous?

We have two :

1- In white → The most numerous is the neutrophils.
2- In Red → The most numerous is the RBCs which Called (erythrocytes)

What is the immature RBCs that will contain polyribosomes for delivery to cells ?

- It's the reticulocyte. → they are stained blue by cresyl stain.

* They are reticulocyte immature RBCs and reticular cells in reticular C.tissue which from fibers and present in the lymphoid tissue

Haemoglobin:

- Iron Containing protein is red in blood cells that carries oxygen for delivery to cells.
- a club of RBCs that appear to be stuck → Rouleax
- stucking of RBCs appears in hypertonic solution «this called Crenation».

1) Myeloblast → stage number one which gives the promyelocytes. in WBCs formation.

2) promyelocytes → are immature WBCs → their important is in forming non-specific granules which Called Azurophilic granules

3) what happen in myocytes → form specific granules.
metamyelocytes → increas in specific granules

Q) Band stage ... what does it mean?
- The word Band means that the Color is still not formed «immature in the blood»
- The band stage will be exposed to labulation.

Q) How does RBCs keep its biconcavity?
- by well-developed cytoskeleton.

Q) Differentiate btw macrophage and phagocyte?
macrophage are type of phagocytes.

phagocyte is a general term involves neutrophils, macrophages and Osteoclast ... ect

Q) How identify the neutrophil for example?
- By the nucleus (lobulation) and cytoplasm (granulocytes or specific granules)

- Stages of WBCs formation:

myeloblast → promyelocyte → myelocyte → metamylocyte → mature WBCs

— neutrophil Contains 3 or 4 or 5 lobes, that's why we sometimes call it hypersegmentation → and this process is called granulopoisis.

specific Granules
non-specific Granules (lysosomes)

- Stages of RBCs formation: (erythropoiesis)

1- proerythroblast → it's characterized by having two nuclei (why) because of Ribosomes.

2- Basophilic erythroblast:
(why it's so called) → becouse it is rich in ribosomes and it's function is forming hemoglobin.

3- polychromatophilic Erythroblast:
(why it's so called) → becouse it accepts different colors, according to the amount of hemoglobin.

4- Normoblast, also called orthochromatic erythroblast.
(why it's so Called) → Because it's red in Colour and Contains haemoglobin with out ribosomes (features of mature RBCs)
The process of removal of nucleus is called « extrusion » then after the extrusion is the stage of reticulocytes → immature RBCs, then RBCs

Megakaryocytes: why it's so called
Because it's very large (why) because of its cytoplasm (why) Because it's the source of platelets.

- What determines the edge of the platelets?
the Smooth endoplasmic reticulum (SER)

LYMPHOID TISSUE :-

- What's the source of lymphocytes?
Bone marrow (myeloid tissue)
we have 2 types of bone marrow active and inactive

* Both T. and B. lymphocytes are formed in the bone marrow and then the T. lymphocytes travel to the thymus and the B. lymphocyte travel to the secondary lymphoid tissue.

* After the atrophy of the thymus the T. lymphocytes leave the thymus and travel to the T. dependent zones in the secondary lymphoid tissue. (spleen and lymph nodes)

* The T.D.Z in lymph nodes is the paracortex and in the spleen is the periarterial lymphoid tissue. (PALS)

Note: by the germinal center we differentiate between the primary and secondory lymph nodules

- Define the primary lymph nodules? (Structurally)
They are aggregation of lymphocytes withe no germinal center, and that means they have the Same Concentration of lymphocytes.

lymphocytes precent in everywhere so we call them homogenous but if the germinal center is present that means it's not homogenous and it's secondary lymph nodule.

Why the germinal center is present?
Because of the activation of lymphocytes.

Why the germinal center is pale?
Because the cells in it are large and few.

What are the 3 structures found in the lymph nodes?
(3 areas)
1- Cortex.
2- medulla.
3- paracortex between them → Called the T.D.Z in lymph nodes.

what's the source of T. lymphocytes? means which brings the T. lymphocytes to the paracortex?
The high endothelial venules → these capillaries are lined by cuboidal cells.

They are special type of blood vessels unlike the other capillaries in the body which are lined by simple squamous epithelium.

The stroma of spleen is made up of what?
It's made up of 3 things
- Capsule
- Septa
- Reticula

---

*Which tonsil has stratified squamous epithelium?
palatine and lingual tissue.

---

*Which one has psedustratified epithelium?
pharyngeal tonsil.

---

*which one has no crypts?
pharyngeal tonsil.

---

*which one of them has branched crypts?
palatin tonsil.

The capsule, where exactly present? (inside or outside)
It present inside in the C.T and it's called incapsulated.

*What is the simplest type of lymphoid tissue?
The defused lymphoid tissue.

---

*What are payer's patches?
They are aggregation of lymph nodules present in the ileum and they cause deformity in the villi of ileum and that's results form the compression of payer's patches.

**payer's patches are associate with M cells (microfold cells or Antigen presenting cells).
M cells help in fighting the antigen in the epithelium befor reaching the lymphoid tissue (payer's patches)

Because we have two lines of defence:

*The first line defence is the epithelium → and we call it mechanical defence.

Stratified → avery strong first line defenca.

---

* The second line defence is the C.T → and we call it Chemical defence → it's related to the immunity system.

CVS:-

- Tonica intima, Tonica emedia, Tonica adrentitia.

* How many layers pusent in the tonica intima?

3 layers (sometimes or always) some times.

endothelium

subendothelium

IEM (internal elastic lamina)

---

* How many layers present in the tonica media of the large arteries?

from 40 layers to 70 layers.

Why the vaso vasorum presents in tonica adventitia in arteries, and in veins

and why we don't but it in tonica media?
Because the elasticity and muscles in tonica media will not allow that, and if we but it in tonica intima, the Pressure which presents in the arteries will affect.

** The tissue fluid comes from the vaso vasorum.

What's the difference between the tissue fluid and lymph?
The Source of tissue fluid is the plasma and the lymph from lymph vessels.

What causes the edema?
The hypoproteinemia.